

CLAIMS

1. A recording medium used for storing data, comprising:

a digital stream generated by multiplexing a video
5 stream and a graphics stream, wherein:

the graphics stream includes a plurality of display
sets each of which is used for a graphics display;

the display set includes a control segment and
graphics data that is assigned an identifier; and

10 if an active period of the control segment in the
display set overlaps with an active period of a control
segment in an immediately preceding display set on a
reproduction time axis of the video stream, the identifier
assigned to the graphics data in the display set differs
15 from an identifier assigned to graphics data which is
referenced by the control segment in the immediately
preceding display set.

2. The recording medium of Claim 1, wherein:

20 graphics generated by decoding the graphics data in
the display set in a reproduction operation is stored into
an object buffer;

the object buffer has a plurality of areas each of
which is used for storing graphics generated by decoding;

25 and

the identifier assigned to the graphics data in the display set identifies one of the plurality of areas.

3. The recording medium of Claim 2, wherein:

5 the active period of the control segment in the display set is from a decoding start time of the control segment in the display set to a display start time of the graphics display which is composited based on the control segment in the display set; and

10 the control segment is provided at a beginning of the display set, and includes time information showing the decoding start time and time information showing the display start time.

15 4. The recording medium of Claim 3, wherein:

the control segment is contained within one packet;

the time information showing the decoding start time is a decoding time stamp written in the packet; and

the time information showing the display start time
20 is a presentation time stamp written in the packet.

5. The recording medium of Claim 1, wherein:

when the identifier assigned to the graphics data in the display set is same as the identifier assigned to
25 the graphics data referenced by the control segment in

the immediately preceding display set, graphics generated by decoding the graphics data in the display set is made up of a same number of horizontal pixels and a same number of vertical pixels as graphics generated by decoding the
5 referenced graphics data.

6. A reproduction apparatus for reproducing a digital stream generated by multiplexing a video stream and a graphics stream, comprising:

10 a video decoder operable to decode the video stream to generate a moving picture; and

a graphics decoder operable to decode the graphics stream to generate graphics, and overlay the graphics and the moving picture, wherein:

15 the graphics decoder includes an object buffer for storing the graphics generated by the decoding;

the graphics stream includes a plurality of display sets each of which includes a control segment and graphics data; and

20 when processing the display set and an immediately preceding display set in a pipeline, the graphics decoder stores graphics generated by decoding the graphics data in the display set into a different area of the object buffer from graphics generated by decoding graphics data
25 which is referenced by a control segment in the immediately

preceding display set.

7. The reproduction apparatus of Claim 6, wherein:

the graphics decoder further includes:

5 a processor operable to decode the graphics data in the display set to generate the graphics, and write the graphics to the object buffer; and

a controller operable to read graphics generated by decoding graphics data referenced by the control segment
10 in the display set from the object buffer, and overlay the read graphics and the moving picture; and

in the pipeline processing, the processor writes the graphics generated by decoding the graphics data in the display set to the object buffer, whilst simultaneously
15 the controller reads the graphics generated by decoding the graphics data referenced by the control segment in the immediately preceding display set from the object buffer.

20 8. The reproduction apparatus of Claim 7, wherein:

the control segment in the display set is provided at a beginning of the display set;

the controller decodes the control segment, and, in accordance with a decoding result of the control segment,
25 reads the graphics from the object buffer and displays

the read graphics.

9. The reproduction apparatus of Claim 8, wherein:

the control segment is contained within one packet;

5 and

the controller starts decoding the control segment at a time shown by a decoding time stamp written in the packet, and starts displaying the graphics at a time shown by a presentation time stamp written in the packet.

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10. The reproduction apparatus of Claim 6, wherein:

if the graphics data in the display set has a different identifier from the graphics data referenced by the control segment in the immediately preceding display set, the graphics decoder stores the graphics generated by decoding the graphics data in the display set into the different area of the object buffer from the graphics generated by decoding the referenced graphics data; and

if the graphics data in the display set has a same identifier as the referenced graphics data, the graphics decoder stores the graphics generated by decoding the graphics data in the display set into a same area of the object buffer as the graphics generated by decoding the referenced graphics data, so as to overwrite the graphics generated by decoding the referenced graphics data.

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11. The reproduction apparatus of Claim 10, wherein:

when the graphics generated by decoding the graphics data in the display set is to overwrite the graphics generated by decoding the referenced graphics data, the graphics generated by decoding the graphics data in the display set is made up of a same number of horizontal pixels and a same number of vertical pixels as the graphics generated by decoding the referenced graphics data.

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12. A method of recording onto a recording medium, comprising the steps of:

generating application data; and

recording the application data to the recording

15 medium, wherein:

the application data includes a digital stream generated by multiplexing a video stream and a graphics stream;

the graphics stream includes a plurality of display sets each of which is used for a graphics display;

the display set includes a control segment and graphics data that is assigned an identifier; and

if an active period of the control segment in the display set overlaps with an active period of a control segment in an immediately preceding display set on a

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reproduction time axis of the video stream, the identifier assigned to the graphics data in the display set differs from an identifier assigned to graphics data which is referenced by the control segment in the immediately
5 preceding display set.

13. A computer-readable program used for enabling a computer to reproduce a digital stream generated by multiplexing a video stream and a graphics stream, the
10 program enabling the computer to perform the steps of:

decoding the video stream to generate a moving picture; and

decoding the graphics stream to generate graphics, and overlaying the graphics and the moving picture,

15 wherein:

the graphics stream includes a plurality of display sets each of which includes a control segment and graphics data; and

when processing the display set and an immediately
20 preceding display set in a pipeline, the step of decoding the graphics stream stores graphics generated by decoding the graphics data in the display set into a different area of an object buffer from graphics generated by decoding graphics data which is referenced by a control segment
25 in the immediately preceding display set.

14. A method of reproducing a digital stream generated by multiplexing a video stream and a graphics stream, comprising the steps of:

5 decoding the video stream to generate a moving picture; and

 decoding the graphics stream to generate graphics, and overlaying the graphics and the moving picture, wherein:

10 the graphics stream includes a plurality of display sets each of which includes a control segment and graphics data; and

 when processing the display set and an immediately preceding display set in a pipeline, the step of decoding
15 the graphics stream stores graphics generated by decoding the graphics data in the display set into a different area of an object buffer from graphics generated by decoding graphics data which is referenced by a control segment in the immediately preceding display set.

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